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A Novel Cluster Analysis on National Quality Awarding in Asian Countries: Thailand, Japan, Singapore and Taiwan

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Abstract

Quality awarding is one of the most important strategies in helping enhancing the competitiveness of private sectors. In Thailand, Thailand Quality Award (TQA) has been well-established and implemented since 2002. However, there is no report on the comparison between quality awards given by Thailand and other Asian countries, namely Japan, Singapore and Taiwan. So, the main objective of this report was to compare the quality awards, namely Malcolm Baldrige National Quality Award (MBNQA), Thailand Quality Award (TQA), Japan Quality Award (JQA), Singapore Quality Award (SQA) and Taiwan National Quality Award (TNQA). Asian quality awards originated from MBNQA with minor modification which was identified by high correlation co-efficiency. Most of the awards were mentioned on result issues, identified by a high range score (400-450 score). Also, major selection criteria for awarding private sectors were depended on the high score base (≥ 700 score), especially in business results. Key results from cluster ranking on those awards were categorized into two groups: 1) TQA, SQA and JQA, and 2) MBNQA and TNQA.

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Keywords: awarding criteria; cluster analysis; correlation co-efficiency; private sector; TQM

1. Introduction

Best quality or premium grade of products and servicing is the primary basis for customer satisfaction and can enhance the competitiveness of private sectors in both national and international levels. Total quality management (TQM) is a good practice of management that will help pushing up the private sectors when integrated with National Quality Awards [1-5]. Many countries have already developed and adopt national quality awards to promote the development of novel products with high quality. These awards also encourage the increase of productivity, improvement of the strategic plan and provision of a role model for other businesses [1-2, 7]. One of the original national quality awards is the Malcolm Baldrige National Quality Award (MBNQA). Its concerns are

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divided into 7 categories to which all categories have strong relationship (Fig. 1) [8]. The continuous improvement prior to maturity of management in terms of standardization, breakthrough and best practices has already been ranged as demonstrated in Fig. 2 [9].

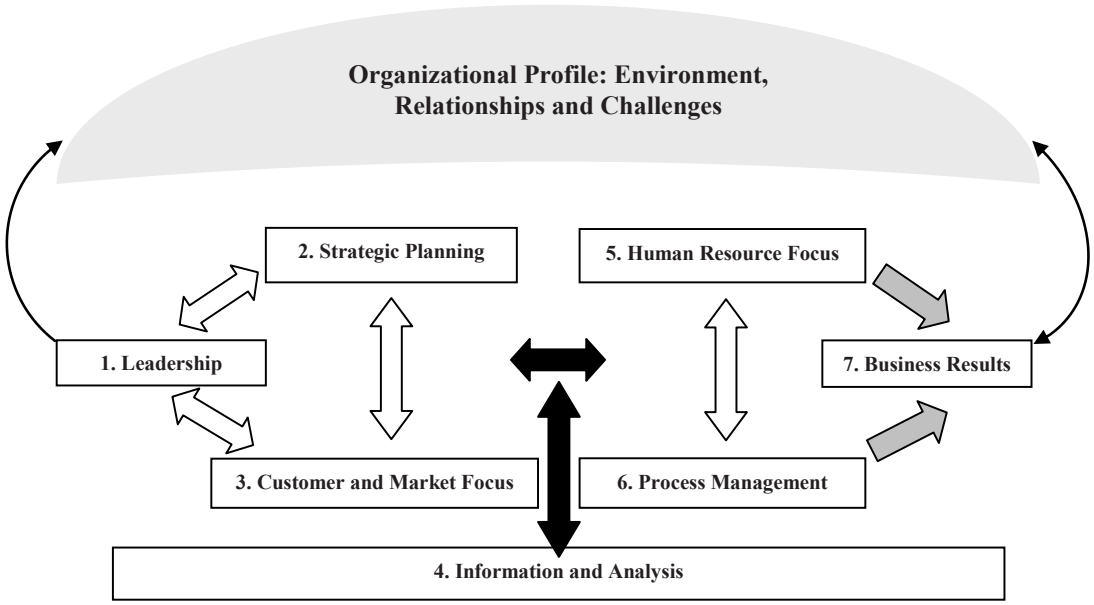

Fig. 1 Diagram of the relationship between evaluation criteria of National Quality Awards.

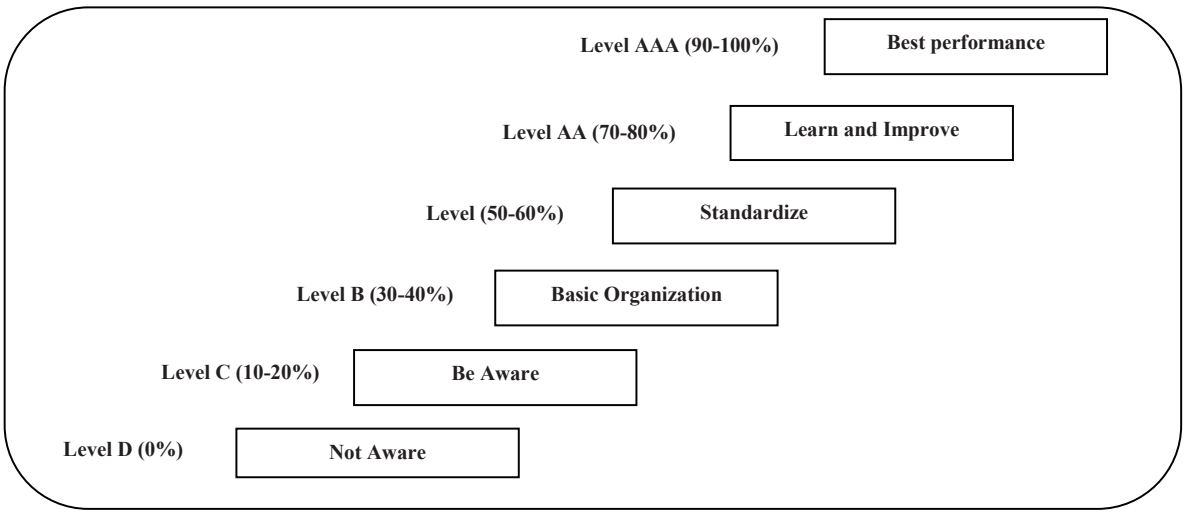

Fig. 2 Principal of improvement strategies prior to best practices in National Quality Awards.

Overall ranking of competitiveness has already published for 59 economies in year 2011 by the World Competitiveness Scoreboard. In Asian countries, Hong Kong (100%), Singapore (98.56%), Malaysia (84.12%), China (81.10%), Korea (78.50%), Japan (75.21%), Thailand (78.89%), India (70.65%), Indonesia (64.61%) and Philippines (63.29%) are ranked to 1, 3, 6, 16, 19, 22, 26, 27, 32, 37 and 41, respectively [10]. For Thailand, the productivity booting is an urgent issue to be concerned as high ranking competitiveness in the world class. The Thailand Quality Award (TQA) initiated by the Thailand Productive Institute (FTPI) and the National Center Science and Technology Development Agency (NSTDA) on September, 5 1996 has been consulted by Singapore Quality Award (SQA) and Japan Quality Award (JQA) committees prior to granting the TQA in year 2002 [11]. However, the comparative comparison on the National Quality awards between TQA and top-ranked awardings in Asia using cluster analysis is still limited. Thus, the objective of this study was to compare TQA to other national quality awards such as MBNQA, JQA, SQA and Taiwan National Quality Award (TNQA).

2. Methodology

Malcolm Baldrige National Quality Award (MBNQA; an original version), Thailand Quality Award (TQA), Japan Quality Award (JQA), Singapore Quality Award (SQA) and Taiwan National Quality Award (TNQA) information were collected from opened sources including the award promotion sites. Selection criteria, number of evaluation issues, weighted score, number of auditors, award score ranking in those awards were compared and demonstrated. Correlation co-efficiency of quality awards was computed using Pearson's correlation in SPSS software. The difference and similar data of selection criteria, number of evaluation issues, weighted score, number of auditors, award score ranking were input classifying the groups using Ward's method of Hierarchical cluster analysis using the SPSS software.

3. Results and Discussion

Quality awards including Thailand Quality Award (TQA), Japan Quality Award (JQA), Singapore Quality Award (SQA) and Taiwan National Quality Award (TNQA) were originated from Malcolm Baldrige National Quality Award (MBNQA), which was well implemented in United State of America (USA) by The United States Congress since 1987. The final goal of quality awarding was pyramided the private sector to business excellence or best practices (Table 1). Also, the criteria for a final decision as quality awards were depended on the nature of countries. For examples, only top 5 or ≥ 550 score of TQA was selected as candidate to site visiting by auditors. In addition, ≥ 550 score was not only requested but also innovation, research and development of novel products to be concerned by TNQA (Table 1).

Table 1 Practical usage and major criteria for a decision making in Quality Awards.

Quality Awards	Practices	Criteria
Malcolm Baldrige National Quality Award (MBNQA)	Best practices and breakthrough excellent management	20% Top
Thailand Quality Award (TQA)	Best practices and breakthrough excellent management	Top 5 ranges or ≥ 550 score
Japan Quality Award (JQA)	Best practices and breakthrough excellent management	≥ 500 score
Singapore Quality Award (SQA)	Best practices and breakthrough excellent management	~100% accepted score
Taiwan National Quality Award (TNQA)	Best practices and breakthrough excellent management	≥ 550 score including innovation, research and development of novel products

Number of evaluation issues in most quality awards (TQA, SQA and TNQA) was set as 7 tasks including 1) Leadership 2) Strategic planning 3) Customer focus 4) Measurement, analysis and knowledge management 5) Workforce focus 6) Operation focus 7) Business results, except JQA (8 tasks adding with social and environmental friendly community). For TQA, the evaluation system was followed original version of MBNQA. Also, the blending of MBNQA, European Quality Award (EQA) and Australia Business Excellence Award was created a novel version of SQA (Table 2). Additionally, the weighting score in all quality awards was stressed on result task for 40-45% (only one issue), except in TNQA only 30% weighting score (Table 3). For TQA, score ranges in item tasks 1-6 were set as 550 (55%), whereas score in only result task was marked as 450 (45%).

Table 2 Number of evaluation issues and additional concerning tasks in Quality Awards.

Quality Awards	Number of evaluation issues	Additional concerning tasks
Malcolm Baldrige National Quality Award (MBNQA)	7	Original version
Thailand Quality Award (TQA)	7	Original version (100% following MBNQA)
Japan Quality Award (JQA)	8	Concern on social and environmental friendly community according to subtopic 1.2 of MBNQA
Singapore Quality Award (SQA)	7	Original version with a blending of MBNQA, European Quality Award and Australia Business Excellence Award
Taiwan National Quality Award (TNQA)	7	Original version including innovation, research and development

Table 3 Weight of score in two major groups, general task and result task of Quality Awards

Quality Awards	General task		Results task	
	Total task	Score	Total task	Score
Malcolm Baldrige National Quality Award (MBNQA)	6	550	1	450
Thailand Quality Award (TQA)	6	550	1	450
Japan Quality Award (JQA)	7	600	1	400
Singapore Quality Award (SQA)	6	600	1	400
Taiwan National Quality Award (TNQA)	6	700	1	300

Number of auditors in each quality award was dependent on their nature. The number of auditors in original version of MBNQA and SQA peaked fat 400-450 assessors, especially in SQA with 100 pre-auditors in an early phrase of submission (Table 4). Also, auditors of TQA, TNQA and JQA were selected for 30-40, 50 and 170 assessors or examiners. Moreover, the ranking group of Asian quality awards was demonstrated as 2-3 clusters, while that of the MBNQA was only 1 ranking group. The best cluster ranking group in most quality awards was approved by ≥ 700 score, except for the JQA (≥ 650 score) (Table 5). Only SQA was clustered into two groups 1) Singapore quality class (≥ 400 score) 2) SQA (≥ 700 score). Correlation co-efficiency in each quality award were evaluated by Pearson's correlation two-tailed analysis and demonstrated in Table 6. There is very high correlation co-efficiency (0.98-0.99) with highly significant at $p \leq 0.01$.

Table 4 Number of evaluation auditor and a prefix of auditors in Quality Awards

Quality Awards	Number of Auditors) person(	Prefix of Auditors
Malcolm Baldrige National Quality Award (MBNQA)	≥ 400 per annum	Examiner
Thailand Quality Award (TQA)	30-40	Assessor
Japan Quality Award (JQA)	170 per annum	Examiner
Singapore Quality Award (SQA)	Pre-audit by 100 with pool of 450 auditors	Assessor
Taiwan National Quality Award (TNQA)	50	Assessor

Table 5 Ranking group and score clustering for Quality Awards

Quality Awards	Ranking group	Score Clustering			
		1	2	3	4
Malcolm Baldrige National Quality Award (MBNQA)	1	Depend on a score ≥ 700			
Thailand Quality Award (TQA)	3	≥ 400		> 500	≥ 700
Japan Quality Award (JQA)	3	Local award		≥ 500	≥ 650
Singapore Quality Award (SQA)	2	SQ class ≥ 400; SQ Award ≥ 700			
Taiwan National Quality Award (TNQA)	3	≥ 400		> 500	≥ 700

Table 6 Correlation coefficient of Quality Awards using Pearson's correlation two-tailed analysis

Quality Awards	MBNQA	TQA	JQA	SQA	TNQA
MBNQA	1.000	-	-	-	-
TQA	0.993**	1.000	-	-	-
JQA	0.985**	0.997**	1.000	-	-
SQA	0.995**	0.989**	0.979**	1.000	-
TNQA	0.993**	0.985**	0.981**	0.985**	1.000

** Correlation is highly significant at the $p \leq 0.01$ level (2-tailed).

In cluster analysis, the raw data of selection criteria, number of evaluation issues, weighted score, number of auditors, award score ranking were inputted to classify the group using Ward's method of Hierarchical cluster analysis using the SPSS software. From the results, cluster ranking on those awarding were categorized into two groups; 1) TQA, SQA and JQA 2) MBNQA and TNQA (Fig. 3).

The original MBNQA with a little modification to suit Asian culture have played a key role as the blueprint in driving competitiveness and efficiency to become world class [12-14]. However, the major barriers in the awarding process and maintaining are applications writing, complicated assessment, lack of qualify auditors and the continuous improvement process [15]. The development of TQA had a long process prior to launch the awarding in 2002 [11]. The comparative analysis of MBNQA and EQA has been well established [16]. In the previous study, the 39 international quality awards in Africa, Asia, Central America, Europe, Oceania North America and South America have been clustered in to 7 groups using K-means [17] with validation of the results

[18]. In Thailand, the TQA has been implemented to SMEs (small and medium enterprises) with large modification as innovative task force [19].

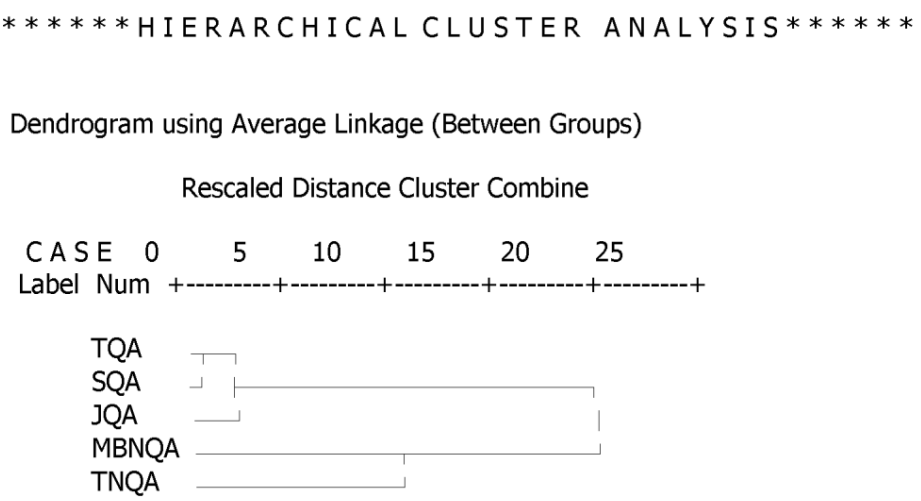

Fig. 3 Dendrogram of cluster analysis in Quality Awards using Ward's Methods of Hierarchical Cluster Analysis.

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